

***Hypostomus fonchii* sp. n. (Siluriformes: Loricariidae) from Peru, a key species suggesting the synonymy of *Cochliodon* with *Hypostomus***

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***Hypostomus fonchii* sp. n. (Siluriformes: Loricariidae) from Peru, a key species suggesting the synonymy of *Cochliodon* with *Hypostomus*.** - *Hypostomus fonchii* sp. n. is described. Diagnostic characters are the unicuspid premaxillary and dentary teeth, present in subadults as well as in adults, and the elongated and broad tooth crown. Because these tooth characters are intermediate between *Hypostomus* and *Cochliodon*, and because dentition traits are the only characters diagnosing *Cochliodon*, the discovery of *H. fonchii* provides evidences for questioning the generic status of *Cochliodon*. We conclude that *Cochliodon* is a subjective junior synonym of *Hypostomus*. This work is the first part of our joint investigations on *Hypostomus* based on both morphological and molecular characters.

**Key-words:** Catfishes - *Hypostomus* - *Cochliodon* - *Hypostomus fonchii* - new species - systematics - teeth.

## INTRODUCTION

The genus *Hypostomus* Lacépède, 1803, represents one of the most diverse Neotropical catfish groups, with about 120 species. The monophyly of this genus has been often questioned and no uniquely derived shared characters have been found (Schaefer, 1986, 1987). The reason lies in the complex and entangled morphological traits and in the substantial intraspecific variability found in *Hypostomus* and closely related genera. In *Hypostomus* systematics, as for most loricariids genera, distinguishing between reliable and misleading morphological characters remains the most problematic task.

During a recent field trip in the Cordillera Azul, Peru, Patrick de Rham, correspondent member of the Museum of Natural History of Geneva, collected three specimens of a remarkable and undescribed hypostomine species. The collecting localities are situated in the middle portion of the Río Ucayali basin (Fig. 1). This species

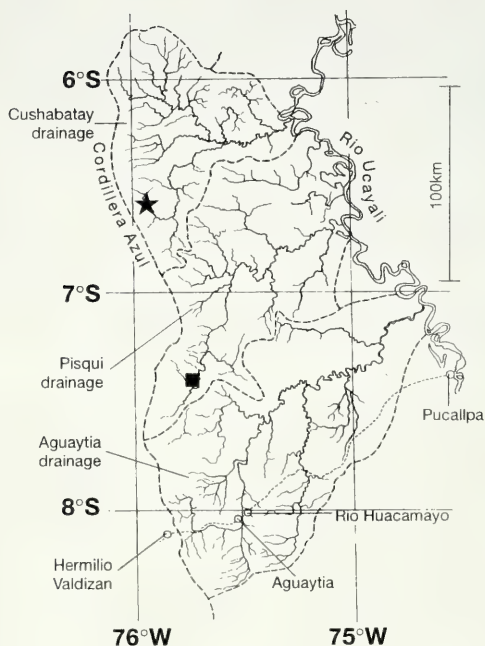


FIG. 1

Map of Cordillera Azul, Ucayali, Peru. Collection localities of *Hypostomus fonchii* sp. n.: ★ = station 1 (type-locality), ■ = stations 2 & 3.

displays large unicuspid teeth in the subadult as well as in adult, a feature that has never been observed in the genus. Among genera close to *Hypostomus*, only adult *Cochliodon* Kner, 1874 possesses such a character (Schultz, 1944; Lilyestrom, 1984). Indeed, the genus *Cochliodon* is presently distinguished from *Hypostomus* only on the basis of its peculiar dentition (Isbrücker, 1981; Armbruster, 1997).

In this first part of our joint study, we describe *Hypostomus fonchii* sp. n. and discuss the validity of the characters diagnosing *Cochliodon*. In the second part (Montoya-Burgos *et al.*, 2002), we propose a molecular phylogeny of *Hypostomus* and related genera which confirms the results presented here and provides furthermore a new view on *Hypostomus* systematics.

## MATERIAL AND METHODS

Specimens examined in this study belong to the fish collections of the following institutions: MAPA: Museu Anchieta, Porto Alegre; MHNG: Muséum d'histoire naturelle, Genève; MNRJ: Museu Nacional, Rio de Janeiro; MUSM: Museo de Historia Natural de la Universidad Nacional Mayor de San Marcos, Lima; MZUSP: Museu de Zoologia, Universidade de São Paulo; NRM: Naturhistoriska Riksmuseet, Stockholm. The measurements and counts follow Boeseman (1968) and Weber (1985).

## DESCRIPTION

*Hypostomus fonchii* sp. n.

Figs 2, 3; Tables 1, 2

## HOLOTYPE

MHNG 2613.66, 141.3 mm of SL (specimen and tissue sample). Peru: Ucayali: Quebrada John, lower part, near mouth in the Río Pauya, in shallow water with emerging rocks, 06° 36' 7.0"S/75°56'26.3"W (GPS), alt. 360 m, Río Cushabatay drainage, Río Ucayali basin (Station 1); 30. Aug. 2000; leg. Patrick de Rham (field n° CA12).

Description of Station 1: Water transparent, substrate composed of large rocks on fine sand and clay. No aquatic vegetation. Water characteristics: depth: 20-200 cm, temperature 25°C, conductivity 160 µs/cm, pH 7.8, total hardness 6.5°. Fishes were collected by hand and snorkeling.

## PARATYPES

MUSM 18791 (1 ex.), 56.3 mm of SL (tissue sample MHNG 2613.67). Peru: Ucayali: Quebradita near the camp "Alto Pisqui Llanura", about 100 m East from the point 08°24' 16"S/75°42'05.5"W (GPS), alt. about 200m, Río Pisqui drainage, Río Ucayali basin (Station 2); 30. Aug. - 05. Sep. 2000; leg. Patrick de Rham (field n° CA37).

Description of Station 2: Water transparent, substrate composed of sand, clay, leaves and dead woods. No aquatic vegetation. Water characteristics: depth: 10-30 cm., temperature 26°C. Fishes were collected with landing nets and fish pots.

MHNG 2613.68 (1 ex.), 50.4 mm of SL (specimen and tissue sample). Peru: Ucayali: unnamed quebrada, in very shallow water, a few hundred meters southeast from the point 08°24' 16"S/75°42'05.5"W (GPS), alt. 550-700m, Río Pisqui drainage, Río Ucayali basin (Station 3); 02. Sep. 2000; leg. Patrick de Rham (field n° CA30).

Description of Station 3: Water transparent, substrate composed of sand, clay and shingle. No aquatic vegetation. Water characteristics: depth: 10-30 cm, temperature 26°C. Fishes were collected with hand nets.

## OTHER SPECIMENS EXAMINED

The following lots may represent the same species, but are excluded from the type series, because these specimens bear clear morphometric differences (see below).

MHNG 2958.91 (2 ex., 72.7 - 72.9 mm of SL). Peru: Ucayali: Coronel Portillo: Río Huacamayo, near the road Pucallpa - Tingo Maria (Carretera Frederico Basadre), 8 km north-east from Aguaytia; Río Aguaytia drainage, Río Ucayali basin; 06. Oct. 1984; leg. Hernan Ortega and Patrick de Rham.

MHNG 2395.61 (1 ex., 124.7 mm of SL). Same locality; 29. Jul. 1986; leg. Hernan Ortega.

## DERIVATIO NOMINIS

This species is named in the memory of Fonchii Chang, who disappeared tragically in 1999, during a field trip in Peru; noun in apposition to the generic name.

## DIAGNOSIS

*Hypostomus fonchii* sp. n. is distinguished from all other *Hypostomus* in having unicuspid premaxillary and dentary teeth, in subadult as well as in adult specimens, instead of teeth with an outer cusp. The crown of the tooth (Fig. 2, e) is elongated and broad (2.24 times width in its length in holotype).

## DESCRIPTION

*Morphology*

Morphometric and meristic data are summarized in Tables 1 and 2.

TABLE 1. Morphometric data of the type specimens of *Hypostomus fonchii* sp. n.

Characters	measurements (mm)				ratio				
	holotype	paratype 1	paratype 2	n	in	holotype	paratype 1	paratype 2	mean
standard length (A)	141.3	56.3	50.4	3					
axial length (B)	166.5	69.2	63.4	3					
total length (C)	191	81.5	72.1	3					
predorsal length (D)	52.1	24	21.7	3	A	2.71	2.35	2.32	2.46
head length (E)	42.3	21.4	19.2	3	A	3.34	2.63	2.63	2.87
cleithral width (F)	40.1	18.4	16.5	3	E	1.05	1.16	1.16	1.13
head depth (G)	27	12.3	11.1	3	E	1.57	1.74	1.73	1.68
snout length (H)	28	12.2	10.5	3	E	1.51	1.75	1.83	1.7
orbital diameter (I)	7.1	4.8	4.3	3	E	5.96	4.46	4.47	4.96
interorbital width (J)	19.6	7.7	6.8	3	E	2.16	2.78	2.82	2.59
dorsal fin spine length (K)	40.5	18.5	16.7	3	A	3.49	3.04	3.02	3.18
dorsal fin spine length (K)				3	D	1.29	1.3	1.3	1.29
dorsal fin base length (L)	39.8	15	14.1	3	A	3.55	3.75	3.57	3.63
interdorsal length (M)	25.5	9	8.1	3	A	5.54	6.26	6.22	6.01
thoracic length (N)	33.9	13.3	12.6	3	A	4.17	4.23	4.00	4.13
pectoral fin spine length (O)	38.2	14.6	12.8	3	A	3.70	3.86	3.94	3.83
abdominal length (P)	29.9	11.5	12	3	A	4.73	4.90	4.20	4.61
ventral fin spine length (Q)	34.5	14.3	10.4	3	A	4.1	3.94	4.85	4.29
caudal peduncle length (R)	49.1	17.3	15.8	3	A	2.88	3.25	3.19	3.11
caudal peduncle depth (S)	14.9	6.1	5.5	3	A	9.48	9.23	9.16	9.29
caudal peduncle depth (S)				3	M	1.71	1.48	1.47	1.55
caudal peduncle depth (S)				3	R	3.3	2.84	2.87	3
adipose fin length (T)	7.8	4.4	3.9	3					
upper caudal ray length (U)	50.1	24.3		2					
lower caudal ray length (V)	47.5	23.9	20.7	3					
rectal barbel length	3.3	2.2	1.8	3					
right mandib. ramus length (RM)	7.3	4	3.5	3	J	2.68	1.93	1.94	2.18



TABLE 2. Meristic data of the type specimens of *Hypostomus fonchii* sp. n.

characters	counts			
	holotype	paratype 1	paratype 2	mean
series of lateral scutes	28	28	28	28
plates bordering supraoccipital	1	1	1	1
predorsal scutes	3	3	3	3
dorsal base scutes	8	9	9	8.7
dorsal to adipose fin scutes	7	7	6	6.7
adipose to caudal fin scutes	9	8	9	8.7
anal to caudal fin scutes	15	15	15	15
teeth on left premaxilla	19	18	20	19
teeth on right premaxilla	19	21	18	19.3
teeth on left dentary	22	18	22	20.5
teeth on right dentary	20	25	21	22

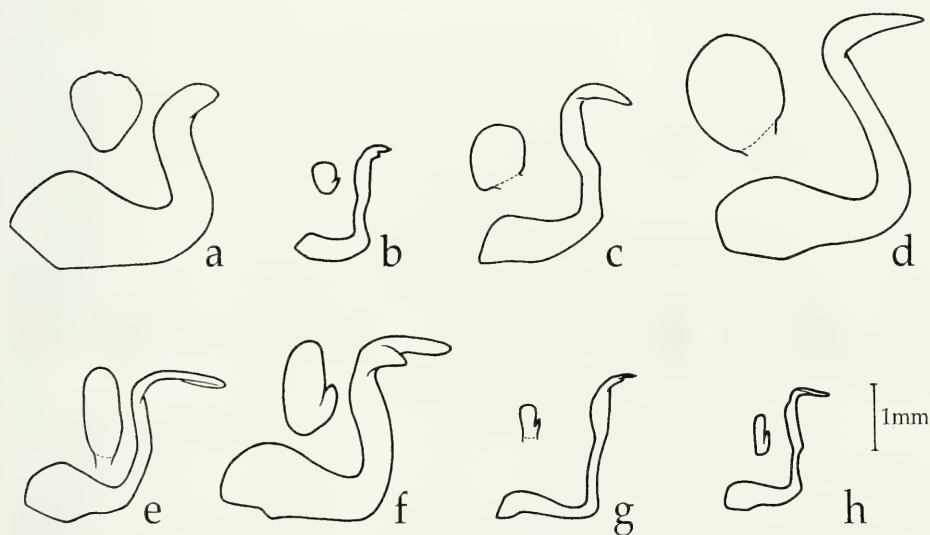
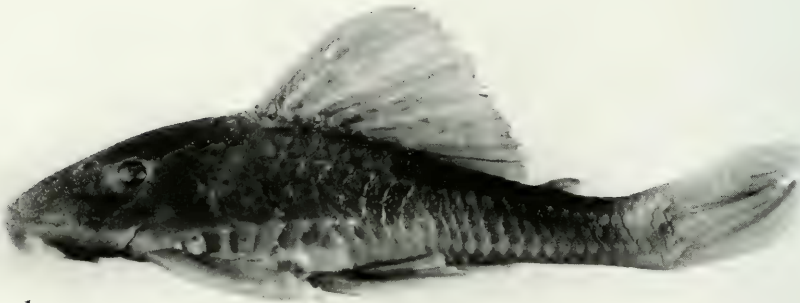


FIG. 2

Profile view of teeth and dorsal view of dental crown (material examined see also Appendix): a, *Cochliodon cochliodon* (Kner, 1854) (LS = 227.8 mm); b, *Cochliodon* sp. 2 (LS = 127 mm) from rio Xingu; c, *Cochliodon* sp. 2 (LS = 157.6 mm) from rio Xingu; d, *Panaque* sp. (LS = 217 mm) from rio Tocantins drainage; e, *Hypostomus fonchii* sp. n. (LS = 141.3 mm); f, *Hypostomus roseopunctatus* Reis *et al.*, 1990 (LS = 133 mm); g, *Hypostomus boulengeri* (Eigenmann & Kennedy, 1903) (LS = 162.4 mm); h, *Hypostomus albopunctatus* (Regan, 1908) (LS = 166.6 mm).

*Adult* (holotype, Fig. 3, a-c). Head dorsally covered with odontods except a small naked area on snout tip, roughly triangular (upside down), as large as nostril. Dorsal margin of orbit very slightly elevated, continuing in smoother ridge on posttemporal and first contiguous plate. Very low ridge on supraoccipital, becoming wider and somewhat more tabular on predorsal plates. One plate bordering posterior margin of supraoccipital. Body deep, dorsal profile gradually descending from dorsal



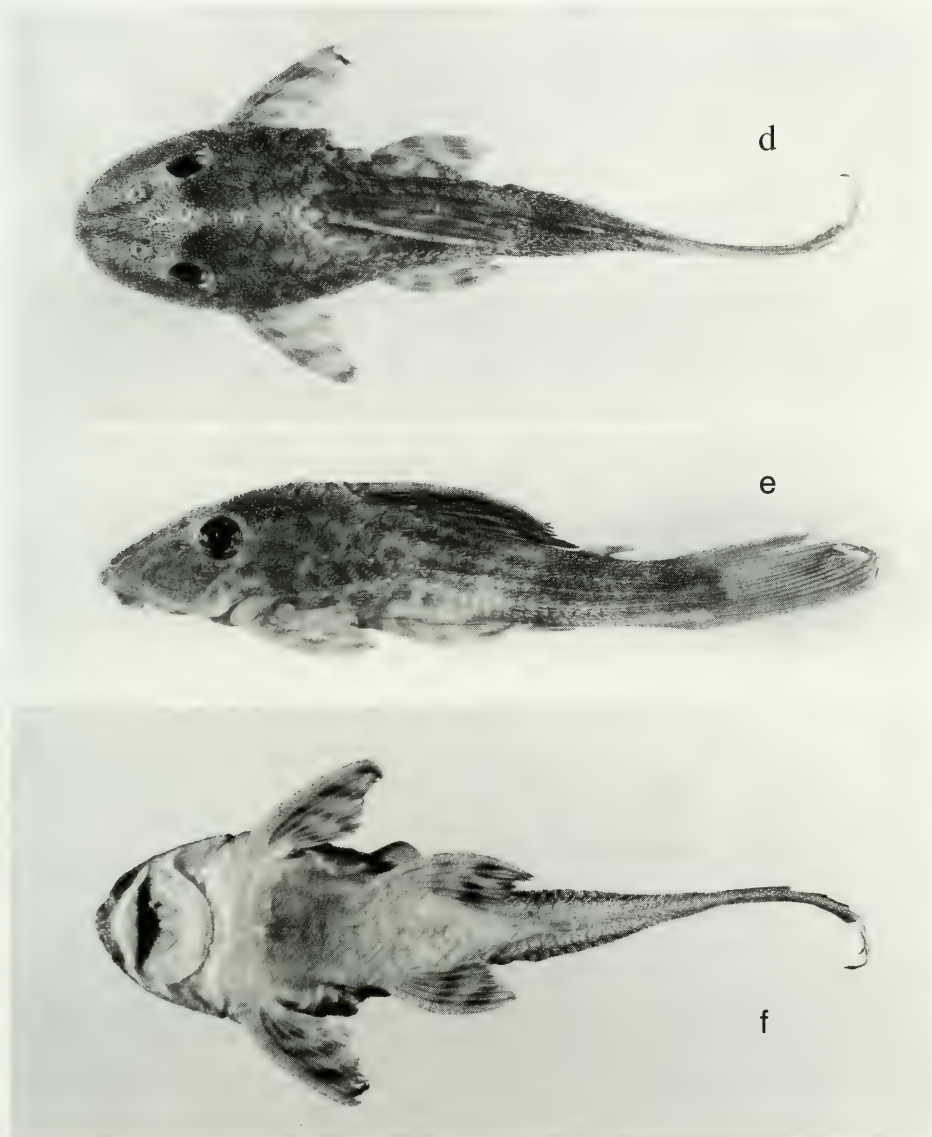


FIG. 3

Adult and juvenile *Hypostomus fonchii* sp. n. Holotype: (a) dorsal, (b) lateral, (c) ventral views; SL = 141.4 mm (MHNG 2613.66). Paratype: (d) dorsal, (e) lateral, (f) ventral views; SL = 56.3 mm (MUSM 18791).

spine origin to four plates before end of caudal peduncle. Caudal peduncle roughly ovate in cross-section; dorsal plates, from middle of dorsal-fin base to end of base of adipose fin, flat in their dorsal portion. Outer face of upper lip covered with small platelets; maxillary barbels short. Teeth moderately large, crown elongated without lateral cusp (Fig. 2, e). Body completely covered with five rows of smooth plates with very slight angle in medial portion, forming four longitudinal nearly un conspicuous ridges. Abdomen and ventral surface of head completely covered with minute platelets. Distal quarter of pectoral-fin spine dorsally covered with progressively larger prominent odontodes, larger ones stronger hooked. Dorsal fin, when layed down, reaches half plate far from adipose fin. Adipose fin medium sized and slightly curved. Caudal-fin margin strongly concave; medium sized outer rays.

*Subadult* (Fig. 3, d-f). Differs from adult in having only small lateral areas of outer face of upper lip covered with small platelets. Platelets of ventral face (head and abdomen) much less numerous and spread on whole surface, isolated from one another. Distal part of pectoral-fin spine without elongated odontodes.

#### *Color pattern (in alcohol)*

*Adult*. Ground color of dorsal surface gray-brown becoming lighter on caudal peduncle; dorsal surface of head with lighter areas between eyes, along middle of snout, and between eye and nostril. Body covered with very small dots becoming larger posteriorly, from first scutes to end of dorsal fin. Posteriorly, dots turn into hazy vertical marks. Color of outer face of upper lip slightly lighter than snout except in a small distal margin, cream colored, as inner part of lips. Dorsal fin mottled, as membranes and branched rays of other fins. Pectoral and ventral spines lighter with few dots. Ventrally, ground color lighter, with scarce small dots close to latero-ventral plates; posteriorly, larger vague dots in whole area between ventral and anal fins. Anal fin with vague transversal bars.

*Subadult*. Differs from adult in having dorsally larger spots, three conspicuous transversal bars in dorsal, pectoral, and ventral fins; ventrally, plain paler ting.

The population from Río Huacamayo differs in having a longer dorsal fin spine ( $D/K=1.06-1.13$  versus  $1.29-1.30$ ) a higher caudal peduncle ( $R/S=2.64-2.80$  versus  $2.84-3.30$ ), a larger mandibular ramus ( $J/RM=1.80-1.92$  versus  $1.93-2.68$ ) with more numerous teeth (26-44 versus 18-25), and by the presence of spots on the dorsal surface of the head and on the dorsal fin.

#### DISTRIBUTION

*Hypostomus fonchii* sp. n. is only known from the Río Cushabatay, Río Pisqui and Río Aguaytia drainage. These rivers are located in the area of the Cordillera Azul, Peru, and are West side tributaries of the middle Río Ucayali (Fig. 1).

#### DISCUSSION

Like most loricariids, *Hypostomus* species possess teeth bearing a lateral cusp (Gosline, 1947). In *Hypostomus*, bicuspid teeth are present in subadult and adult stages (Weber, 1986). Contrasting with this common feature, the genus *Cochliodon*



was established on the basis of its particular dentition: teeth are unicuspid, spoon-shaped, massive and few in number (Kner, 1854). Later on, Eigenmann (1922) described the genus *Cheiridodus*, separating it from *Cochliodon* by the presence of a "small lobe on the outer edge of the base of each tooth" (referred here as bicuspid tooth). Eigenmann's description was based on two young specimens of current *Cochliodon honda* (Regan, 1912) (70 and 88 mm axial length). In describing *Cochliodon pospisili* (presently a synonym of *C. honda*), Schultz (1944) reported that young specimens up to 60 mm standard length possess teeth with such a lobe (bicuspid tooth), however he noticed that these teeth are gradually replaced by unicuspid teeth in adults. Based on these observations, Schultz pointed out the necessity of revising the relationship between *Cheiridodus* and *Cochliodon*. Dahl (1971, and reference therein) recognized *Cheiridodus* as a synonym of *Cochliodon*, stressing the fact that the description of *Cheiridodus* is based on immature specimens still bearing bicuspid tooth. The ontogenic modification of teeth in *C. honda* was confirmed by Lilyestrom (1984) who observed that only scarce specimens of more than 100 mm standard length still bear bicuspid teeth. In our own observations of *Cochliodon cochliodon* (Kner, 1854), *Cochliodon oculus* (Fowler, 1943), and *Cochliodon* sp. 1, the teeth replacement occurs in specimens with a comparable body size range (Fig. 4) as the values cited above. The fact that *Cochliodon* species undergo a dentition modification during their growth, gradually replacing their bicuspid by unicuspid teeth when reaching adult size, is thus well documented.

Due to its peculiar dentition, *Hypostomus fonchii* sp. n. can be referred neither to *Hypostomus* nor to *Cochliodon*. The tooth of *H. fonchii*, which displays a single main cusp and which is identical in adults as well as in subadults (Fig. 2, e; Fig. 4), is a unique character among these genera. Nevertheless, the elongated and thin stem, the thin root, and the elongated main cusp of *H. fonchii* tooth are reminiscent of those found in the *Hypostomus regani* group (Fig. 2, h), as defined in Muller & Weber (1992). On the other hand, the absence of the lateral cusp is generally considered as a synapomorphy of *Cochliodon*, when referring to adult specimens. The fact that *H. fonchii* presents somewhat intermediate teeth compared to *Hypostomus* and *Cochliodon* rises the question of whether this new species has to be placed in a new genus or if the validity of tooth morphology as generic diagnostic character is to be reconsidered. Indeed, placing *H. fonchii* either in *Hypostomus* or in *Cochliodon* would challenge, at least in part, the validity of the tooth shape as diagnostic character for *Cochliodon*. Placing *H. fonchii* within *Hypostomus* invalidates the adult unicuspid-tooth criterion uniting *Cochliodon* species. Placing *H. fonchii* within *Cochliodon* invalidates in turn the massive, few in number and spoon-shaped tooth criteria uniting *Cochliodon* species. If *H. fonchii* is to be placed in a new genus, the latter will share common features with both *Hypostomus* and *Cochliodon*, and will invalidate as well the adult unicuspid-tooth criterion uniting *Cochliodon*. In all three cases, the diagnostic characters supporting *Cochliodon* are questionable to a point at which the generic status of *Cochliodon* should be reconsidered. Because none of the alternatives is fully convincing, the most reasonable way to solve this taxonomic question is to consider *Cochliodon* as a synonym of *Hypostomus*.



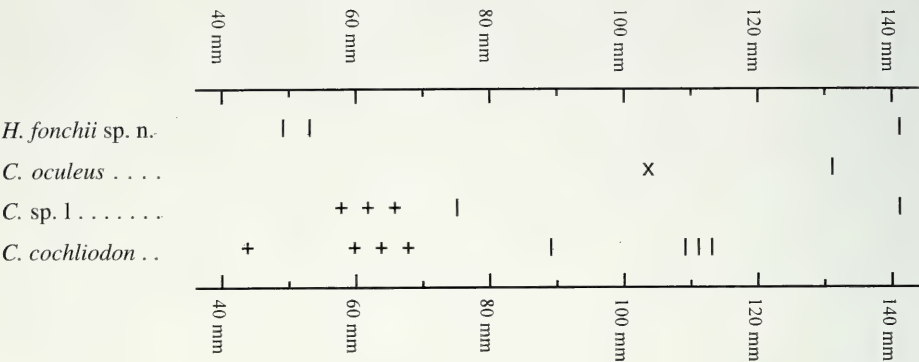


FIG. 4

Tooth morphology as a function of standard length in *Hypostomus fonchii* sp. n. and *Cochliodon* spp. (material examined see Appendix): (+) premaxillary and dentary teeth with lateral cuspid; (l) absence of lateral cuspid; (x) mixture of teeth with and without lateral cuspid.

The tooth survey reported in this study (Fig. 2) provides additional arguments for questioning the generic status of *Cochliodon* based on tooth morphology. Every state of root width, stem length and crown size can be found among *Cochliodon* and *Hypostomus* species. Setting apart the number of cusps of the crown, the tooth of *H. roseopunctatus* Reis, Weber & Malabarba, 1990 (Fig. 2, f) shows more affinities to *C. cochliodon* tooth (Fig. 2, a) than to the one of *H. boulengeri* Eigenmann & Kennedy, 1903 (Fig. 2, g), whereas *H. boulengeri* tooth is more similar to the one of the undescribed *Cochliodon* sp. 2 (Fig. 2, b-c). According to Isbrücker (1981), *Cochliodon* sp. 2 can be attributed to the *Cochliodon* genus without doubt due to its bicuspid subadult tooth and its unicuspid spoon-shaped adult tooth. Nevertheless, the slenderness of the tooth stem and root, and the small size of the crown of *Cochliodon* sp. 2 are reminiscent of *Hypostomus* teeth. As to *H. fonchii*, its teeth (Fig. 2, e) is more *Hypostomus*-like (for example *Hypostomus albopunctatus* Regan, 1908; Fig 2, h), but the unicuspid criterion brings it closer to *Cochliodon*. The evident outcome of this comparative analysis is that tooth morphology can no longer be used for diagnosing *Cochliodon*.

Lastly, the tooth of *Panaque* sp. (Fig. 2, d) shows strong similarities with *Cochliodon*. Schaefer & Stewart (1993), while describing *Panaque maccus*, exposed in details various teeth shapes, from slender comb-shaped and bicuspid, to spoon-shaped and unicuspid with an intermediate state, more spoon-shaped and bicuspid. They pointed out an allometric association between tooth morphology and standard length, as for *Cochliodon*. It is a striking example of tooth polymorphism and possible convergences among loricariids.

In addition to the tooth related arguments presented here for considering *Cochliodon* as a synonym of *Hypostomus*, which are of prime importance because they concern the diagnostic characters, two other independent phylogenetic works support our conclusions. The first work, based on osteological characters, suggests that

*Cochliodon*, together with other closely related genera, emerge from *Hypostomus* and, therefore, are *Hypostomus* synonyms (Armbruster, 1997). The second work, based on mitochondrial D-loop sequences and which is presented in this volume (Montoya-Burgos *et al.*, 2002), suggests that *Cochliodon*, and only this genus, emerges from *Hypostomus*. Moreover, the mitochondrial sequence analyzes indicate that *H. fonchii*, in turn, emerges within *Cochliodon*.

With these new elements at hand, we can propose a reconstruction of the evolution of *H. fonchii* dentition. According to the scenario where *Cochliodon* emerges from *Hypostomus* and where *H. fonchii* emerges from *Cochliodon*, the tooth of *H. fonchii* represents the ultimate state in a three step series starting from the plesiomorphic bicuspid-tooth state (*Hypostomus*), followed by bicuspid tooth present in young specimen and gradually replaced by unicuspid tooth in adult (*Cochliodon*), and ending in the young and adult unicuspid-tooth state (*H. fonchii*). This same scenario, however, implies that the elongated cusp present in *H. fonchii* is a homoplastic character because similar main cusp shapes are often found in other *Hypostomus* species, whereas all *Cochliodon* described so far show a spoon-shaped cusp. The possibility that the shape of the main cusp can be homoplastic within *Cochliodon* plus *Hypostomus* is supported by the important variability of this character among species, and even within species, as reported by Weber (1986) and Muller & Weber (1992). Nevertheless, these authors found that the combination of tooth characteristics with mouth morphology can be used for defining species or groups of species.

## CONCLUSIONS

Because only dentition characters diagnose *Cochliodon*, separating it from *Hypostomus*, the discovery of *H. fonchii* sp. n. and the analysis of its peculiar teeth enable us to state that *Cochliodon* has to be considered as a subjective junior synonym of *Hypostomus*. This proposal is congruent with two independent phylogenetic works, one based on osteology, the other based on molecular data. Moreover, this new species provides a critical example stressing that great care should be taken when using tooth morphology as a diagnostic generic criterion within the family Loricariidae.

The following nomenclature modifications derive from the synonymization of *Cochliodon* with *Hypostomus*.

### *Hypostomus* Lacepède, 1803

*Hypostomus* Lacepède, 1803: 145. Type species: *Acipenser plecostomus* Linnaeus, 1754.

*Cochliodon* Heckel in Kner, 1854: 265. **Syn. n.** Type species: *Hypostomus cochliodon* Kner, 1854.

*Cheiridodus* Eigenmann, 1922: 70. Type species: *Plecostomus honda* Regan, 1912.

The following species move to new combinations (comb. n.) or their original combinations are revalidated (comb. reval.):

*Hypostomus cochliodon* Kner, 1874 comb. reval.

*Plecostomus hondae* Regan, 1912 = *Hypostomus hondae* (Regan, 1912) comb. n.

Synonym: *Cochliodon pospisili* Schultz, 1944 = *Hypostomus pospisili* (Schultz, 1944) comb. n.

*Rhinelepis levis* Pearson, 1924 = *Hypostomus levis* (Pearson, 1924) comb. n.

*Panaque oculus* Fowler, 1943 = *Hypostomus oculus* (Fowler, 1943) comb. n.

*Cochliodon plecostomoides* Eigenmann, 1922 = *Hypostomus plecostomoides* (Eigenmann, 1922) comb. n.

*Cochliodon pyrineusi* Miranda Ribeiro, 1920 = *Hypostomus pyrineusi* (Miranda Ribeiro, 1920) comb. n.

*Cochliodon taphorni* Lilyestrom, 1984 = *Hypostomus taphorni* (Lilyestrom, 1984) comb. n.

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We dedicate this work to Fonchii Chang, who devoted her life to the advancement of ichthyology in Peru, her country.

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## REFERENCES

- ARMBRUSTER, J.W. 1997. Phylogenetic Relationships of the Sucker-Mouth Armored Catfishes (Loricariidae) with Particular Emphasis on the Ancistrinae, Hypostominae and Neoplecostominae. *Unpublished Ph.D. Dissertation, University of Illinois, Urbana*, 405 pp., 134 figs, 2 appendix.
- BOESEMAN, M. 1968. The genus *Hypostomus* Lacépède, 1803, and its Surinam representatives (Siluriformes, Loricariidae). *Zoologische Verhandelingen, Rijksmuseum van Natuurlijke Historie te Leiden* 99: 1-89, 18 pls, 20 tabs.
- DAHL, G. 1971. Los Peces del norte de Colombia. Bogota, *INDERENA*.
- EIGENMANN, C. H. 1922. The fishes of western South America, part 1. The fresh-water fishes of Northwestern South America, including Colombia, Panama, and the Pacific slopes of Ecuador and Peru, together with an appendix upon the fishes of the Río Meta in Colombia. *Memoirs of the Carnegie Museum, Pittsburg* 9(1): 1-346, 38 pls.
- GOSLINE, W. A. 1947. Contribution to the classification of the loricariid catfishes. *Archivos do Museu nacional, Rio de Janeiro* 41: 79-134, 9 pls.
- ISBRÜCKER, I. J. H. 1981. A treatise of the Loricariidae Bonaparte, 1831, a family of South American mailed catfishes, with emphasis on the subfamily Loricariinae (Pisces, Siluriformes). *Unpublished Ph.D. Dissertation, Université de Nancy I, Nancy*, 224 pp., 52 pls.
- KNER, R. 1854. Die Hypostomiden. Zweite Hauptgruppe der Familie der Panzerfische (Loricata vel Goniodontes). *Denkschriften der Akademie der Wissenschaften, Wien, mathematische-naturwissenschaftliche Klasse* 7: 251-286, 5 pls.

- LILYESTROM, C. G. 1984. Consideraciones sobre la taxonomía de las especies del género *Cochliodon* Heckel en Venezuela (Pisces, Loricariidae). *Revista UNELLEZ de Ciencia y Tecnología, Serie Producción agrícola, Venezuela* 2(2): 41-53.
- MONTOYA-BURGOS, J. I., WEBER, C. & LE BAIL, P.-Y. 2002. Phylogenetics relationships within *Hypostomus* (Siluriformes: Loricariidae) and related genera based on mitochondrial D-loop sequences. *Revue suisse de Zoologie* 109 (2): 369-382.
- MULLER, S. & WEBER, C. 1992. Les dents des sous-familles Hypostominae et Ancistrinae (Pisces, Siluriformes, Loricariidae) et leur valeur taxonomique. *Revue suisse de Zoologie* 99(4): 747-754.
- SCHAEFER, S. A. 1986. Historical biology of the loricariid catfishes: Phylogenetics and functional morphology. *Unpublished Ph.D Dissertation, University of Chicago, Chicago*, 198 pp., 46 figs.
- SCHAEFER, S. A. 1987. Osteology of *Hypostomus plecostomus* (Linnaeus), with a phylogenetic analysis of the loricariid subfamilies (Pisces: Siluroidei). *Contributions in Science, Los Angeles* 394: iii-iv, 1-31.
- SCHAEFER, S. A. & STEWART, D. J. 1993. Systematics of the *Panaque dentex* species group (Siluriformes: Loricariidae), wood-eating armored catfishes from tropical South America. *Ichthyological Exploration of Freshwaters* 4(4): 309-342.
- SCHULTZ, L. P. 1944. The catfishes of Venezuela, with description of thirty-eight new forms. *Proceedings of the United States National Museum, Washington* 94: 173-338.
- WEBER, C. 1985. *Hypostomus dlouhyi*, nouvelle espèce de poisson-chat cuirassé du Paraguay (Pisces, Siluriformes, Loricariidae). *Revue suisse de Zoologie* 94(4): 955-968.
- WEBER, C. 1986. Révision de *Hypostomus boulengeri* (Eigenmann and Kennedy) et deux espèces nouvelles de poissons-chats du Paraguay (Pisces, Siluriformes, Loricariidae). *Revue suisse de Zoologie* 93(4): 979-1007.

#### APPENDIX. Other material examined.

*Hypostomus cochliodon* Kner, 1854 (previously *Cochliodon cochliodon*)

MHNG 2527.38 (3 ex), 41.6 - 73.8 mm of SL. Paraguay: Concepción: Riacho La Paz 6 km North of Estancia Primavera, Río Paraguay basin; 19-20 Oct. 1991; leg. C. Dlouhy, S. Muller and C. Vaucher.

MHNG 2527.40 (4 ex), 60.8 - 122.7 mm of SL. Paraguay: Concepción: Arroyo Aegre, tributary of Riacho La Paz, 6 km southeast of Estancia Primavera, Río Paraguay basin; 16-19 Oct. 1991; leg. C. Dlouhy, S. Muller and C. Vaucher.

MHNG 2395.39 (1 ex), 90.2 mm of SL. Paraguay: Concepción: Arroyo Alegre, tributary of Riacho La Paz, 6 km southeast of Estancia Primavera, Río Paraguay basin; 20 Oct. 1985; leg. C. Dlouhy, A. de Chambrier and C. Vaucher.

MHNG 2236.92 (2 ex), 111.3 - 111.8 mm of SL. Paraguay: Concepción: Arroyo Tagatija-Guazu, tributary of the Río Napegue, ford on the road Paso Horqueta - Estancia Santa-Maria, Río Paraguay basin; 20 Oct. 1985; leg. C. Dlouhy, V Mahnert and C. Vaucher.

*Hypostomus oculus* (Fowler, 1943) (previously *Cochliodon oculus*)

NRM 27052 (1 ex.), 104.3 mm of SL. Colombia: Caqueta: Quebrada Montanita, alt. 400 m.; 26 Feb. 1993; leg. A. Stalsberg.

MHNG not registered. Ecuador: Napo: Río Aguarico, Lago Agrio, Río Napo basin; Summer 1985; leg. U. Werner.

*Hypostomus* sp. 1 (undescribed, previously *Cochliodon* sp. 1)

MHNG 2395.38 (4 ex.) 58.1 - 100.7 mm of SL. Paraguay: : Concepción: Arroyo Alegre, tributary of Riacho La Paz, 6 km southeast of Estancia Primavera, Río Paraguay basin; 5 Nov. 1987; leg. C. Dlouhy, A. de Chambrier and C. Vaucher.

MHNG 2395.39 (1 ex.) 147.1 mm of SL. Paraguay: Concepción: Arroyo Alegre, tributary of Riacho La Paz, 6 km southeast of Estancia Primavera, Río Paraguay basin; 03 Nov. 1987; leg. C. Dlouhy, A. de Chambrier and C. Vaucher.



MHNG 2527.40 (2 ex.) 65.3 – 73.7 mm of SL. Paraguay: Concepción: Arroyo Alegre, tributary of Riacho La Paz, 6 km southeast of Estancia Primavera, Río Paraguay basin; 19 Oct. 1991 leg. C. Dlouhy, S. Muller and C. Vaucher.

MHNG 2236.93 (1 ex.) 141.4 mm de LS. Concepcion: Arroyo Azotey, affluent du Río Ypané, Río Paraguay basin, 0.3 km north of Cororo, route No 3; field n° PY 3343; 22 Oct. 1983; leg. C. Dlouhy and C. Weber.

MHNG 2236.96 (1 ex.) 193– 275 mm de LS. Paraguay: Cordillera: Río Piribebuy, tributary of Río Paraguay, 5 km North Emboscada Nueva; 6 Apr. 1985; leg F. Baud, C. Dlouhy and V. Mahnert.

*Hypostomus* sp. 2 (undescribed, previously *Cochliodon* sp. 2)

MZUSP 34284 (1 ex.), 127 mm of SL. Brazil: Pará: Rio Xingu at Belo Monte; Jul. 1983; leg. M. Goulding (Field number 29908).

MZUSP 34213 (1 ex.), 157,6 mm of SL. Brazil: Pará: Igarapé de Santo Antônio, Transamazônica road near Belo Monte, Rio Xingu drainage; 27 Oct. 1983; leg. M. Goulding (field n° 30494).

*Hypostomus roseopunctatus* Reis, Weber & Malabarba, 1990

MAPA 2315 (1 ex) 133 mm of SL. Brazil: Rio Grande do Sul: Río Uruguai at Uruguaiana, Rio Paraná basin; 14 May 1984; leg R. E. Reis.

*Hypostomus albopunctatus* (Regan, 1908)

BMNH 1907.7.6.15. Lectotype (1 ex.) 166.6 mm of SL. Brazil: São Paulo: Rio Piracicaba, Rio Paraná basin; leg. R. v. Ihering.

*Hypostomus* sp.

MNRJ 15371 (1 ex.), 158.2 mm of SL. Brazil: Goiás: Rio Maranhão, downstream of Cachoeira do Machadinho, Barro Alto / Niquelândia area, Rio Tocantins basin ; 13 Oct. 1996; leg E. P. Caramaschi, D. F. Moraes Jr and D. A. Halboth (field n°: BR 1134; PSM 06-3921).

*Panaque* sp.

MNRJ 15247 (1ex), 217 mm of SL. Brazil: Goiás: Niquelândia, Rio Maranhão, near mouth of Rio do Peixe, Rio Tocantins basin; 10 Oct. 1996; leg. E. Pellegrini Caramaschi, D. F. Moraes Jr and D. A. Halboth (field n°: BR 1081; PSM 06-3224).